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RAW SEQUENCE LISTING

DATE: 03/19/2002

PATENT APPLICATION: US/10/087,013

TIME: 16:16:07

Input Set : A:\NIH176.001C1.TXT

Output Set: N:\CRF3\03192002\J087013.raw

Does Not Comply
Corrected Diskette Needed

4 <110> APPLICANT: Arthur Scherf
5 Louis H. Miller
6 Benoit Gamain
7 Dror I. Baruch
8 Pierre Buffet
9 Christine Scheidig
10 Jurg Gysin
11 Bruno Pouvelle
12 Nobutaka Fujii
13 Joseph Smith
15 <120> TITLE OF INVENTION: IDENTIFICATION OF THE DOMAIN OF
16 PLASMODIUM FALCIPARUM ERYTHROCYTE MEMBRANE PROTEIN 1
17 (PFEMP1) THAT MEDIATES ADHESION TO CHONDROITIN SULFATE A
20 <130> FILE REFERENCE: NIH176.001C1
22 <140> CURRENT APPLICATION NUMBER: US/10/087,013
22 <141> CURRENT FILING DATE: 2002-02-21
22 <150> PRIOR APPLICATION NUMBER: PCT/US00/24195
23 <151> PRIOR FILING DATE: 2000-09-01
25 <150> PRIOR APPLICATION NUMBER: 60/152,023
26 <151> PRIOR FILING DATE: 1999-09-01
28 <160> NUMBER OF SEQ ID NOS: 11
30 <170> SOFTWARE: FastSEQ for Windows Version 4.0

ERRORED SEQUENCES

217 <210> SEQ ID NO: 2
218 <211> LENGTH: 3542
219 <212> TYPE: PRT
220 <213> ORGANISM: Plasmodium falciparum
222 <400> SEQUENCE: 2
223 Met Gly Phe Ser Cys Lys Tyr Phe Ile Ile Lys Met Gly Asn Ala Ala
224 1 5 10 15
225 Ser Ser Leu Glu Gly Asp Ala Lys Ser Pro Ile Ile Lys Glu Ser His
226 20 25 30
227 Lys Ser Ala Arg Asn Val Leu Glu Arg Tyr Ala Lys Asn Ile Arg His
228 35 40 45
229 Pro Ser Lys Tyr Ala Lys Glu His Val Asp Ser Leu Lys Gly Asp Leu
230 50 55 60
231 Thr Lys Ala Glu Phe Arg Gly Gly Pro Ser Thr Pro Val Asn Lys His
232 65 70 75 80
233 Asn Tyr Tyr Tyr Tyr Pro Tyr Pro Cys Asn Leu Asp His Lys Glu His Thr
234 85 90 95

PP. 5, 10

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235 Asn Leu Arg Tyr Asp Asp Val Asn Leu Arg His Pro Cys His Gly Arg
236      100      105      110
237 Glu Gln Asn Arg Phe Asp Glu Asp Glu Glu Ser Glu Cys Gly Asn Lys
238      115      120      125
239 Ile Arg Asn Tyr Lys Arg Lys Asn Asp Ala Ile Ala Cys Ala Pro Pro
240      130      135      140
241 Arg Arg Arg His Met Cys Asp Lys Asn Leu Glu Ala Leu Asn Asp Ile
242 145      150      155      160
243 Asn Thr Gln Asn Ile His Asp Leu Leu Gly Asn Val Leu Val Thr Ala
244      165      170      175
245 Lys Tyr Glu Gly Glu Ser Ile Val Asn Asn His Pro His Lys Gly Thr
246      180      185      190
247 Ser Asp Ala Cys Thr Ala Leu Ala Arg Ser Phe Ala Asp Ile Gly Asp
248      195      200      205
249 Ile Val Arg Gly Ile Asp Met Phe Lys Pro Asn Val His Asp Lys Val
250      210      215      220
251 Glu Thr Gly Leu Arg Glu Val Phe Lys Lys Ile His Asp Gly Met Glu
252 225      230      235      240
253 Asp Glu Val Lys Asn Asp Tyr Asn Pro Asp Gly Ser Gly Asn Tyr Tyr
254      245      250      255
255 Lys Leu Arg Glu Ala Trp Trp Asn Val Asn Arg Asn Lys Val Trp Glu
256      260      265      270
257 Ala Ile Thr Cys Asp Ala Ser Tyr Lys Ser Gly Tyr Phe Met Gln Ser
258      275      280      285
259 Glu Ser Asn Thr Pro Leu Phe Ser Asn Pro Lys Cys Gly His Lys Gln
260      290      295      300
261 Gly Lys Val Pro Thr Asn Leu Asp Tyr Val Pro Gln Tyr Leu Arg Trp
262 305      310      315      320
263 Phe Asp Glu Trp Gly Glu Glu Phe Cys Arg Lys Arg Asn Ile Lys Leu
264      325      330      335
265 Lys Lys Val Lys Asp Ser Cys Arg Asn Asp Lys Glu Arg Leu Tyr Cys
266      340      345      350
267 Ser His Asn Gly His Asp Cys Thr Thr Ile Trp Lys Lys Gly Ile
268      355      360      365
269 Leu His Leu Asp Asn Lys Cys Thr Asp Cys Ser Thr Lys Cys Lys Val
270      370      375      380
271 Phe Glu Val Trp Leu Gly Asn Gln Gln Glu Ala Phe Lys Lys Gln Lys
272 385      390      395      400
273 Glu Lys Tyr Glu Lys Glu Ile Gln Ser Tyr Leu Ser Asn Asp Asn Lys
274      405      410      415
275 Phe Val Asn Asn Ile Asn Ser Glu Tyr Tyr Lys Gln Phe Tyr Glu Lys
276      420      425      430
277 Leu Lys Glu Thr Gln Tyr Ala Thr Asn Asp Thr Phe Leu Asn Leu Leu
278      435      440      445
279 Asn Glu Gly Lys Tyr Cys Lys Gly Gly Leu Pro Gly Glu Lys Asp Ile
280      450      455      460
281 Thr Phe Thr Asn Ser Ala Asp Asp Lys Gly Ile Phe Tyr Arg Ser Glu
282 465      470      475      480
283 Tyr Cys Gln Val Cys Pro Asp Cys Gly Val Lys Cys Asp Gly Ile Lys

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284                               485                               490                               495
285 Tyr Thr His Lys Ser Asp Asn Asp Arg Glu Arg Val Asn Asn Glu Asp
286                               500                               505                               510
287 Tyr Lys Pro Pro Trp Gly Val Lys Pro Thr Asn Ile Thr Val Leu Tyr
288                               515                               520                               525
289 Ser Gly Asn Glu Gln Gly Asp Ile Thr Gln Lys Leu Glu Asn Phe Cys
290                               530                               535                               540
291 Asn Ser Ser Thr Asn Tyr Lys Asp Lys Asn Asn Gln Lys Trp Glu Cys
292 545                               550                               555                               560
293 Tyr Tyr Lys Asp Glu Asn Ile Asn Arg Cys Lys Leu Glu Gln Asn Thr
294                               565                               570                               575
295 Glu Ile Asn Asn Asp Asn Pro Lys Ile Ile Ser Phe His Asn Phe Phe
296                               580                               585                               590
297 Glu Leu Trp Val Thr Tyr Leu Leu Arg Asp Thr Ile Lys Trp Asn Asp
298                               595                               600                               605
299 Lys Leu Lys Thr Cys Ile Asn Asn Thr Thr Thr His Cys Ile Asp Glu
300                               610                               615                               620
301 Cys Asn Arg Asn Cys Leu Cys Phe Asp Arg Trp Val Lys Gln Lys Glu
302 625                               630                               635                               640
303 Glu Glu Trp Asn Ser Ile Lys Lys Leu Phe Thr Lys Lys Lys Asn Ile
304                               645                               650                               655
305 Gln Gln Ser Tyr Tyr Ser Asn Ile Asn Asn Leu Phe Glu Gly Tyr Phe
306                               660                               665                               670
307 Phe Lys Val Met Asp Lys Leu Asp Lys Asp Glu Ala Lys Trp Lys Glu
308                               675                               680                               685
309 Leu Met Glu Asn Ile Lys Arg Lys Lys Asn Glu Phe Ser Asn Leu Glu
310                               690                               695                               700
311 Asn Asn Arg Asp Tyr Leu Glu Asn Ala Ile Glu Leu Leu Leu Asp His
312 705                               710                               715                               720
313 Leu Lys Glu Thr Ala Thr Ile Cys Lys Asp Asn Asn Thr Asn Glu Ala
314                               725                               730                               735
315 Cys Glu Thr Ser His Asn Ala Thr Thr Asn Pro Cys Val Lys Pro Arg
316                               740                               745                               750
317 Gly Gly Thr Gln Pro Thr Lys Asn Ile Lys Glu Ile Ala Gln Tyr Phe
318                               755                               760                               765
319 Lys Arg Ser Ala Tyr Glu Glu Ala Arg Asn Arg Gly Leu His Lys Leu
320                               770                               775                               780
321 Lys Gly Lys Ala His Glu Gly Ile Tyr Lys Arg Gly Gly Arg Arg Lys
322 785                               790                               795                               800
323 Asp Phe Lys Asp Asn Leu Cys Arg Ile Met Ile Lys His Ser Asn Arg
324                               805                               810                               815
325 Asn Leu Gly Phe Ser Asn Gly Pro Cys Asp Gly Lys Gly Thr Gly Asp
326                               820                               825                               830
327 Gly Ile Gln Thr Arg Phe Val Val Gly Thr Glu Trp Glu Val Asp Pro
328                               835                               840                               845
329 Glu His Met Arg Lys Asp His Glu Asp Val Ile Met Pro Pro Arg Arg
330                               850                               855                               860
331 Arg His Ile Cys Thr Ser Asn Leu Glu His Leu Gln Thr Asp Asp His
332 865                               870                               875                               880

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333 Pro Leu Asn Gly Asn Ile Val Asp Asp Leu Val Asn Asn Ser Phe Leu
334      885      890      895
335 Gly Asp Val Leu Leu Ser Ala Lys Tyr Glu Ala Asn Lys Ile Ile Arg
336      900      905      910
337 Met Tyr Lys Glu Lys Asn Asn Leu Lys Gly Pro Lys Glu Val Thr Asp
338      915      920      925
339 Pro Lys His Gln Thr Thr Ile Cys Arg Ala Ile Arg Tyr Ser Phe Ala
340      930      935      940
341 Asp Ile Gly Asp Ile Ile Arg Gly Arg Asp Leu Trp Glu Arg Asn Gly
342 945      950      955      960
343 Asp Met Val Lys Leu Gln Gly His Leu Glu Thr Val Phe Gly Asn Ile
344      965      970      975
345 His Lys Ser Leu Lys Gly Lys Gly Asn Asp Lys Tyr Asn Asp Asp Ala
346      980      985      990
347 Pro Lys Tyr Leu Lys Leu Arg Glu Asn Trp Trp Glu Ala Asn Arg Ala
348      995      1000      1005
349 Lys Val Trp Glu Ala Met Lys Cys Asp Ile Lys Tyr Leu Lys Asp Lys
350      1010      1015      1020
351 Ser Gly His Gln Ser Thr Gln Ser Ser Tyr Cys Gly Tyr Ser Asp His
352 1025      1030      1035      1040
353 Thr Pro Leu Asp Asp Tyr Ile Pro Gln Lys Leu Arg Trp Met Thr Glu
354      1045      1050      1055
355 Trp Ala Glu Trp Tyr Cys Lys Val Gln Lys Lys Glu Tyr Asp Lys Leu
356      1060      1065      1070
357 Lys Glu Lys Cys Lys Glu Cys Lys Asp Lys Asp Asn Gly Gln Gly Cys
358      1075      1080      1085
359 Thr Lys Glu Ser Gly Thr Gly Cys Thr Lys Cys Thr Glu Ala Cys Asn
360      1090      1095      1100
361 Glu Tyr Asn Asp Ile Ile Gly Leu Trp Lys Glu Gln Trp Asn Ile Ile
362 1105      1110      1115      1120
363 Ser Asp Lys Tyr Lys Glu Leu His Glu Gln Ala Gln Met Ser Val Ser
364      1125      1130      1135
365 Asn Ser Gly Ile Glu Ala Ser Ser Thr Ala Lys Asn His Ile Asp Arg
366      1140      1145      1150
367 Asn Val Ile Glu Phe Leu Ser Glu Leu Tyr Gln Gln Asn Gly Gly Lys
368      1155      1160      1165
369 Ser Asn Lys Ser Gly Thr Ser Asp Glu Ser Ala Val Ile Gly Thr Asn
370      1170      1175      1180
371 Thr Thr Tyr Glu Asn Val Gly Ala Tyr Leu His Asp Thr Gly Asn Phe
372 1185      1190      1195      1200
373 Asp Asp Cys Gln Ser Gln Asn Glu Phe Cys Asp Glu Lys Ser Asp Gly
374      1205      1210      1215
375 Lys Asp Asn Glu Lys Tyr Ala Phe Arg Asp Lys Pro Gln Asp His Asp
376      1220      1225      1230
377 Gly Ala Cys Gly Cys Lys Ser Gly Ser Lys Pro Thr Arg Val Gln Ile
378      1235      1240      1245
379 Lys Thr Lys Lys Lys Ala Glu Glu Lys Asp Thr Glu Cys Lys Thr Val
380      1250      1255      1260
381 Asn Asp Ile Leu Lys Glu Asn Asp Gly Lys Lys Gln Val Glu Asp Cys

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382 1265          1270          1275          1280
383 His Pro Lys Lys Asn Ser Asn Gly Tyr Pro Asp Trp Gln Cys Gly Asn
384          1285          1290          1295
385 Ile Asn Leu Val Glu Asp Pro Arg Val Cys Met Pro Pro Arg Arg Gln
386          1300          1305          1310
387 Lys Leu Cys Val His Phe Leu Ala Asn Asp Asn Glu Ile Lys Lys Leu
388          1315          1320          1325
389 Gln Ser Gln Val Asn Leu Lys Glu Ala Phe Ile Lys Ser Ala Ala Ala
390          1330          1335          1340
391 Glu Thr Phe Phe Ser Trp Tyr Tyr Tyr Lys Ser Lys Asp Gly Glu Gly
392 1345          1350          1355          1360
393 Asn Glu Leu Asp Lys Glu Leu Lys Glu Gly Lys Ile Pro Pro Ala Phe
394          1365          1370          1375
395 Leu Arg Ser Met Phe Tyr Thr Phe Gly Asp Tyr Arg Asp Phe Leu Phe
396          1380          1385          1390
397 Gly Thr Asp Ile Ser Lys Gly His Gly Glu Gly Ser Lys Leu Lys Glu
398          1395          1400          1405
399 Gln Ile Asp Ser Leu Phe Lys Asn Gly Asp Gln Lys Ser Pro Asn Gly
400          1410          1415          1420
E--> 401 Lys Thr Arg Gln Glu Trp Trp Thr Glu His Ser His Glu Ile Trp Glu
402 1425          1430          1435          1440 more over
403 Ala Met Leu Cys Ala Leu Val Lys Ile Gly Ala Lys Lys Asp Asp Phe
404          1445          1450          1455
405 Thr Glu Asn Tyr Gly Tyr Asn Asn Val Lys Phe Ser Asp Lys Ser Thr
406          1460          1465          1470
407 Thr Leu Glu Glu Phe Ala Lys Arg Pro Gln Phe Leu Arg Trp Leu Thr
408          1475          1480          1485
409 Glu Trp Tyr Asp Asp Tyr Cys Tyr Thr Arg Gln Lys Tyr Leu Lys Asp
410          1490          1495          1500
411 Val Gln Glu Lys Cys Lys Ser Asn Asp Gln Leu Lys Cys Asp Thr Glu
412 1505          1510          1515          1520
413 Cys Asn Lys Lys Cys Glu Asp Tyr Val Lys Tyr Met Lys Lys Lys Lys
414          1525          1530          1535
415 Glu Trp Ile Pro Gln Asp Lys Tyr Tyr Lys Asp Glu Arg Asp Lys Lys
416          1540          1545          1550
417 Arg Phe Asp Arg Gln His Ile Gly Val Met Val Thr Asp Tyr Thr Gly
418          1555          1560          1565
419 Thr Asn Ala Thr Asp Tyr Leu Asn Arg Lys Phe Thr Ala Ser Cys Gly
420          1570          1575          1580
421 Asp Lys Pro Gly Ser Ala Ser Val Val Gln Arg Asn Ile Gln Leu Leu
422 1585          1590          1595          1600
423 Glu Lys Gln Ala Tyr Tyr Asp Ala Asp Lys His Cys Gly Cys Thr Lys
424          1605          1610          1615
425 Phe Ile Glu Asn Asp Asp Lys Tyr Thr Asn Ile Ser Ser Lys Asp Lys
426          1620          1625          1630
427 Cys Lys Gly Leu Val Lys Glu Ala Asn Thr Gly Ala Ile Lys Trp Gln
428          1635          1640          1645
429 Asn Lys Gly Pro Asn Asn Tyr Asn Asn Leu Lys Glu Leu Thr Glu Asp
430          1650          1655          1660

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```

431 Val Leu Phe Pro Ser Arg Arg Leu Arg Ile Cys Phe His Ala Leu Asp
432 1665                      1670                      1675                      1680
433 Gly Asn Tyr Thr Asp Pro Glu Val Lys Asp Glu Asn Gly Leu Arg Lys
434                      1685                      1690                      1695
435 Arg Leu Met Glu Val Ala Ala Thr Glu Gly Tyr Asn Leu Gly Gln Tyr
436                      1700                      1705                      1710
437 Tyr Lys Glu Lys Lys Glu Lys Glu Lys Ile Lys Thr Ser Asp Ala His
438                      1715                      1720                      1725
439 Lys Tyr Ser Tyr Glu Val Pro Pro Cys Ser Ala Met Lys Tyr Ser Phe
440                      1730                      1735                      1740
441 Tyr Asp Leu Arg Asp Ile Ile Leu Gly Ile Asp Asn Leu Glu Asp Glu
442 1745                      1750                      1755                      1760
443 Lys Gln Lys Thr Glu Glu Asn Leu Lys Lys Ile Phe Asn Lys Asn Gly
444                      1765                      1770                      1775
445 Thr Ser Val Gly Lys Gly Ser Asp Ser Thr Thr Gly Asn Pro Gly Ser
446                      1780                      1785                      1790
447 Thr Ala Arg Lys Phe Phe Trp Asn Glu Asn Lys Glu Cys Val Trp Asn
448                      1795                      1800                      1805
449 Ala Met Ile Cys Gly Tyr Lys Arg Gly Arg Asp Asp Gly Asn Ser Gly
450                      1810                      1815                      1820
451 Asn Ser Ala Arg Ser Asp Glu Asp Leu Lys Lys Cys Gly Ser Val Pro
452 1825                      1830                      1835                      1840
453 Ser Asp Asp Asp Tyr Pro Met Gly Lys Asn Arg Asp Glu Gly Thr Ala
454                      1845                      1850                      1855
455 Tyr Gln Phe Leu Arg Trp Phe Ala Glu Trp Gly Glu Asp Phe Cys Lys
456                      1860                      1865                      1870
457 His Lys Glu Lys Glu Leu Glu Lys Leu Val Gly Ala Cys Asn Asp Tyr
458                      1875                      1880                      1885
459 Thr Cys Gly Asp Asn Glu Asp Lys Arg Lys Lys Cys Thr Asp Ala Cys
460                      1890                      1895                      1900
461 Thr Gln Tyr Lys Lys Phe Ile Ser Glu Trp Lys Pro Gln Tyr Glu Lys
462 1905                      1910                      1915                      1920
463 Gln Ile Lys Lys Tyr Gly Glu Asn Lys Asp Lys Ile Tyr Ser Glu His
464                      1925                      1930                      1935
465 Pro Val Ala Lys Asp Ala Glu Asp Ala Arg Glu Tyr Leu Asp Lys Gln
466                      1940                      1945                      1950
467 Leu Lys Lys Ile Cys Glu Asn Lys Ser Gly Asp Cys Glu Tyr Lys Cys
468                      1955                      1960                      1965
469 Met Lys Asp Val Ser Thr Gln Arg Leu Thr Asp Gly Asn Ser Gln Asn
470                      1970                      1975                      1980
471 Met Pro Ala Ser Leu Asp Asp Glu Pro Lys Glu Val Glu Gly Lys Cys
472 1985                      1990                      1995                      2000
473 Asn Cys Gln Val Pro Arg Gly Pro Pro Arg Val Arg Arg Glu Thr Pro
474                      2005                      2010                      2015
475 Ser Pro Arg Val Ser Leu Ile Ser Lys Ala Thr Ala Ser Lys Lys Glu
476                      2020                      2025                      2030
477 Ala Lys Thr Ala Pro Pro Thr Lys Gln Pro Lys Lys Val Glu Asn Leu
478                      2035                      2040                      2045
479 Thr Thr Glu Met Arg Ala Gln Thr Arg Thr Arg Arg Ala Ala Gln Gln

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480      2050      2055      2060
481 Thr Arg Lys Arg Thr Ser Thr Ala Thr Thr Thr Glu Ser Asp Val Gly
482 2065      2070      2075      2080
483 Thr Met Val Lys Ala Ile Leu Ser Asn Lys Pro Asp Ser Arg Gly Gly
484      2085      2090      2095
485 Ile Glu Gly Cys Asn Pro Lys Thr Tyr Gly Gln Tyr Pro Lys Trp Gly
486      2100      2105      2110
487 Cys Ile Val Gly Lys Ser Lys Glu Asn Glu Asn Gly Ile Cys Met Pro
488      2115      2120      2125
489 Pro Arg Arg Lys Lys Leu Cys Ile Asn Asn Ile Gln Tyr Leu Asn Tyr
490      2130      2135      2140
491 Glu Thr Glu Asn Lys Arg Asp Asn Asp Ile Lys Glu Ala Phe Ile Lys
492 2145      2150      2155      2160
493 Cys Ala Ala Ile Glu Thr Gln Phe Leu Trp Leu Lys Tyr Ile Ile Glu
494      2165      2170      2175
495 Asn Pro Ala Ala Glu Asn Glu Leu Gln Asn Gly Thr Ile Pro Asp Glu
496      2180      2185      2190
497 Phe Lys Arg Ile Met Tyr Tyr Thr Tyr Gly Asp Tyr Lys Asp Met Phe
498      2195      2200      2205
499 Phe Gly Thr Asp Ile Ser Asn Asp Lys Lys Ile Ile Thr Val Thr Asn
500      2210      2215      2220
501 Ser Val Thr Thr Ile Leu Asn Glu Asn Asn Lys Lys Lys Gln Asp Lys
502 2225      2230      2235      2240
503 Lys Lys Asp Glu Glu Leu Arg Lys Ile Phe Trp Glu Lys Asn Lys Lys
504      2245      2250      2255
505 Phe Ile Trp Glu Gly Met Ile Tyr Gly Leu Thr Tyr His Leu Thr Asp
506      2260      2265      2270
507 Glu Asn Glu Lys Glu Lys Ile Arg Asp Asn Tyr Gln Tyr Asn Asp Met
508      2275      2280      2285
509 Thr Lys Leu Thr Pro Ser Leu Glu Glu Phe Val Lys Arg Pro Gln Phe
510      2290      2295      2300
511 Leu Arg Trp Phe Thr Glu Trp Ala Glu Glu Phe Cys Asn Lys Arg Lys
512 2305      2310      2315      2320
513 Glu Gln Leu Leu Lys Leu Glu Ala Gly Cys Lys Glu Tyr Glu Cys Asn
514      2325      2330      2335
515 Gly Ser Asn Asp Gly Lys Thr Gln Glu Cys Ala Glu Ala Cys Val Thr
516      2340      2345      2350
517 Tyr Gln Asn Phe Ile Lys Lys Trp Lys Thr Glu Tyr Glu Arg Gln Arg
518      2355      2360      2365
519 Glu Lys Phe Lys Lys Asp Lys Asp Gly Lys Lys Tyr Lys Asp Tyr Pro
520      2370      2375      2380
521 Ser Thr Glu Arg Asp Ile Glu Lys Ala Thr Cys Ala His Glu Tyr Leu
522 2385      2390      2395      2400
523 Asn Met Lys Leu Lys Glu Leu Cys Gly Asn Lys Asp Cys Ser Cys Met
524      2405      2410      2415
525 Gln Lys Pro Ser Ser Gln Leu Pro Lys Thr Thr Gln Gln Ser Gln Ser
526      2420      2425      2430
527 Ser Asp Ala Asn Asp Met Pro Glu Ser Leu Asp Tyr Val Pro Glu Glu
528      2435      2440      2445

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529 Phe Asn Lys Cys Glu Cys Pro Glu Leu Ser Lys Lys Gly Ser Met Ile
530      2450                      2455                      2460
531 His Thr Lys Lys Ile Thr Glu Pro Lys Ile Pro Met Asn Cys Val Glu
532 2465                      2470                      2475                      2480
533 Lys Ala Ala Tyr Tyr Leu Ser Lys Glu Ala Glu Asn Asn Met Asp Ile
534                      2485                      2490                      2495
535 Thr Leu Lys Glu Lys Phe Ile Pro Ile Glu Ser Thr Lys Glu Lys Glu
536                      2500                      2505                      2510
537 Ser Lys Asn Ser Trp Thr Asn Asn Asn Pro Cys Asp Pro Lys Lys Pro
538                      2515                      2520                      2525
539 Tyr Ala Pro Asp Lys Tyr Ile Gly Arg Arg Asn Pro Cys Glu Asn Arg
540      2530                      2535                      2540
541 Glu Glu Asn Arg Phe Lys Val Asp Tyr Glu Trp Lys Cys Tyr Lys Asn
542 2545                      2550                      2555                      2560
543 Ser Lys Phe Tyr Gln Glu Lys Lys Arg Val Cys Val Pro Pro Arg Arg
544                      2565                      2570                      2575
545 Glu His Met Cys Leu Arg Asn Leu Asp Glu Ile Lys Ile Glu Arg Leu
546                      2580                      2585                      2590
547 Lys Asp Ser Asn Tyr Leu Leu Lys Met Val Arg Arg Thr Ala Arg Asn
548                      2595                      2600                      2605
549 Glu Gly Ile Asp Ile Ile Lys Asn Phe Asn Ser Glu Asn Gly Cys Ala
550      2610                      2615                      2620
551 Met Asn Pro Ile Cys Asp Thr Met Lys Tyr Ser Phe Ala Asp Leu Gly
552 2625                      2630                      2635                      2640
553 Asp Ile Val Arg Gly Thr Asp Met Leu Arg Ile Gly Gly Tyr Leu Pro
554                      2645                      2650                      2655
555 Pro Val Glu Ile Lys Leu Tyr Lys Val Phe Glu Tyr Ile Tyr Gly Lys
556                      2660                      2665                      2670
557 Trp Arg Asn Lys Asn Lys Gly Arg Asn Lys Tyr Asn Asp Val Gln Thr
558                      2675                      2680                      2685
559 Phe Arg Ser Ala Trp Trp Asp Ala Asn Arg Lys Asp Ile Trp Lys Ala
560      2690                      2695                      2700
561 Met Thr Cys Lys Ala Pro Glu Asp Ala Lys Leu Phe Arg Lys Gly Arg
562 2705                      2710                      2715                      2720
563 Met Asp Gly Phe Glu Arg Ile Thr Leu Ile Gln Asp Lys Cys Gly His
564                      2725                      2730                      2735
565 Lys Asp Asp Pro Pro Val Asp Asp Tyr Ile Pro Gln Arg Phe Arg Trp
566                      2740                      2745                      2750
567 Met Thr Glu Trp Ser Glu Tyr Tyr Cys Lys Ala Leu Met Glu Glu Leu
568                      2755                      2760                      2765
569 Glu Lys Phe Lys Lys Ser Cys Asp His Cys Lys Thr Ser Asp Arg Cys
570      2770                      2775                      2780
571 Lys Asn Asp Tyr Asp Glu Asn Lys Cys Glu Gln Cys Lys Thr Arg Cys
572 2785                      2790                      2795                      2800
573 Gln Glu Tyr Lys Asn Phe Val Leu Lys Trp Lys Ser Leu Phe Asp Ile
574                      2805                      2810                      2815
575 Gln Ser Asn Lys Tyr Lys Glu Leu Tyr Glu Gln Pro Ile Tyr Thr Lys
576      2820                      2825                      2830
577 Ile Ser Thr Tyr Asp His Val Gln Asn Phe Val Gln Lys Leu Lys Thr

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578          2835          2840          2845
579 Phe Lys Ser Glu Cys Ser Val Glu Ser Phe Ser Glu Tyr Leu His Glu
580          2850          2855          2860
581 Thr Ser Lys Cys Leu Asn Tyr Lys Phe Asn Glu Asn Asp Gly Ser Ser
582 2865          2870          2875          2880
583 Asn Ile Arg Thr Tyr Ala Phe Glu Glu Thr Pro Lys Ser Tyr Lys Glu
584          2885          2890          2895
585 Ala Cys Ser Cys Thr Leu Pro Ser Lys Asn Pro Leu Asp Asn Cys Pro
586          2900          2905          2910
587 Thr Asp Gln Asn Lys Asp Gly Cys Lys Glu Leu Gln Thr Phe Thr Phe
588          2915          2920          2925
589 Cys Ser Lys Asn Asp Tyr Asp Asn Asn Leu Asp Asn Trp Asn Ala Tyr
590          2930          2935          2940
591 Leu Val Leu Asn Ser Ser Asp Asp Asn Lys Gly Val Leu Ile Pro Pro
592 2945          2950          2955          2960
593 Arg Arg Arg His Leu Cys Thr Arg Pro Ile Thr Ala Tyr Asn Tyr Arg
594          2965          2970          2975
595 Lys Gly Asp Lys Glu Ile Leu Lys Lys Lys Leu Leu Thr Ser Ala Phe
596          2980          2985          2990
597 Ser Gln Gly Gln Leu Leu Gly Gln Lys Tyr Lys Ser Glu Glu Leu
598          2995          3000          3005
599 Cys Phe Glu Ala Met Lys Tyr Ser Tyr Ala Asp Tyr Ser Asp Ile Ile
600          3010          3015          3020
601 Lys Gly Thr Asp Met Met Asp Thr Ser Leu Ser Glu Lys Ile Lys Lys
602 3025          3030          3035          3040
603 Ile Phe Glu Thr Ser Asn Glu Ala Thr Glu Asn Arg Lys Thr Trp Trp
604          3045          3050          3055
605 Glu Asn Asn Arg Arg Gln Ile Trp His Ala Met Leu Cys Gly Tyr Lys
606          3060          3065          3070
607 Ile Ala Thr Ser Lys Val Thr Leu Asp Glu Gly Trp Cys Gln Leu Pro
608          3075          3080          3085
609 Lys Asp Glu Glu Thr Asn Gln Phe Leu Arg Trp Leu Ile Glu Trp Ala
610          3090          3095          3100
611 Lys Gln Ala Cys Lys Glu Lys Lys His Val Ser Asp Ser Leu Lys Thr
612 3105          3110          3115          3120
613 Lys Cys Pro Arg Ser Asn Glu Asp Asn Phe Glu Ala Ser Glu Leu Leu
614          3125          3130          3135
615 Arg Gln Pro Gly Cys Gln Asn Asp Ile Arg Lys Tyr Ile Ser Leu Asn
616          3140          3145          3150
617 Ile Leu Ile Lys Asn Thr Met Glu Asn Leu Asn Ile Lys Tyr Lys Gln
618          3155          3160          3165
619 Leu Lys Asp Gln Ser Ser Gly Asn Ile Asp Asn Lys Pro Ser Glu Glu
620          3170          3175          3180
621 Asn Val Gln Ser Tyr Ile Lys Ser Lys Asp Ser Gln Cys Ala Leu Glu
622 3185          3190          3195          3200
623 Leu Asn Asp Ile Asn Glu Ile Val Thr Gly Thr Lys Asn Asn Glu Asn
624          3205          3210          3215
625 Asn Glu Phe Lys Glu Val Leu Lys Lys Leu Tyr Pro Gly Leu Tyr Phe
626          3220          3225          3230

```

RAW SEQUENCE LISTING

PATENT APPLICATION: US/10/087,013

DATE: 03/19/2002

TIME: 16:16:07

Input Set : A:\NIH176.001C1.TXT

Output Set: N:\CRF3\03192002\J087013.raw

```

627 Val Glu Asp Glu Thr His Lys Asn His Val Leu Asp Gly Asn Ile Lys
628          3235          3240          3245
629 Glu Glu Glu Gln Thr Val Arg Pro Lys Ala Leu Tyr Phe Phe Thr Pro
630          3250          3255          3260
631 His Val Asp Ser Phe Tyr Gln Ala Pro Leu Phe Ser Thr His Arg Val
632 3265          3270          3275          3280
633 Ala Gln Tyr Asp Pro Lys Asn Asp Ile Leu Lys Ser Ser Ile Ser Val
634          3285          3290          3295
635 Val Ile Val Ser Ala Leu Gly Leu Ile Ala Leu His Phe Met Lys Lys
636          3300          3305          3310
637 Lys Phe Lys Ser Ser Val Asp Leu Leu Arg Ile Leu Asn Ile Pro Gln
638          3315          3320          3325
639 Gly Glu Tyr Gly Met Pro Thr Leu Glu Ser Lys Asn Arg Tyr Ile Pro
640          3330          3335          3340
641 Tyr Arg Ser Gly Pro Tyr Lys Gly Lys Thr Tyr Ile Tyr Met Glu Gly
642 3345          3350          3355          3360
643 Asp Thr Ser Gly Asp Glu Asp Lys Tyr Met Trp Asp Leu Ser Ser Ser
644          3365          3370          3375
645 Asp Ile Thr Ser Ser Glu Ser Glu Tyr Glu Glu Leu Asp Ile Asn Asp
646          3380          3385          3390
647 Ile Tyr Val Pro Gly Ser Pro Lys Tyr Lys Thr Leu Ile Glu Val Val
648          3395          3400          3405
649 Leu Glu Pro Ser Lys Arg Asp Ile Pro Ser Asp Asp Thr Pro Ser Asn
650          3410          3415          3420
651 Asp Thr Pro Arg Thr Asn Arg Phe Ile Asp Asp Glu Trp Asn Glu Leu
652 3425          3430          3435          3440
653 Lys His Asp Phe Val Ser Gln Tyr Leu Pro Asn Thr Glu Pro Asn Asn
654          3445          3450          3455
655 Asn Tyr Lys Ser Ala Asp Ile Pro Met Asn Thr Glu Pro Asn Thr Leu
656          3460          3465          3470
657 Tyr Ser Asp Asn Pro Glu Glu Lys Pro Phe Ile Ile Ser Ile His Asp
658          3475          3480          3485
659 Arg Asp Leu Tyr Thr Gly Lys Glu Ile Ser Tyr Asn Ile Asn Met Ser
660          3490          3495          3500
661 Thr Asn Thr Asn Asn Asp Ile Pro Met Asn Ala Arg Asn Asp Ser Tyr

```

E--> 662

3505

3510

3515

3520 Arg Gly Ile Asp Leu Ile Asn Asp

664 <210> SEQ ID NO: 3

665 <211> LENGTH: 32

666 <212> TYPE: PRT

667 <213> ORGANISM: Plasmodium fallciparum

669 <400> SEQUENCE: 3

670 Glu Ala Glu Lys Glu Leu Lys Glu Gly Lys Ile Pro Glu Gly Phe Lys

E--> 671

1

5

10

15

Arg Gln Met Phe Tyr Thr Phe Gly

673 <210> SEQ ID NO: 4

674 <211> LENGTH: 10

675 <212> TYPE: PRT

676 <213> ORGANISM: Plasmodium falciparum

678 <400> SEQUENCE: 4

E--> 679 Lys Glu Leu Lys Glu Gly Lys Ile Pro Glu

5

10

RAW SEQUENCE LISTING

DATE: 03/19/2002

PATENT APPLICATION: US/10/087,013

TIME: 16:16:07

Input Set : A:\NIH176.001C1.TXT

Output Set: N:\CRF3\03192002\J087013.raw

681 <210> SEQ ID NO: 5
682 <211> LENGTH: 4
683 <212> TYPE: PRT
684 <213> ORGANISM: Plasmodium falciparum
686 <400> SEQUENCE: 5
E--> 687 Lys Glu Gly Lys 1 *hard return*
689 <210> SEQ ID NO: 6
690 <211> LENGTH: 6
691 <212> TYPE: PRT
692 <213> ORGANISM: Plasmodium falciparum
694 <220> FEATURE:
695 <223> OTHER INFORMATION: misc_difference
697 <223> OTHER INFORMATION: misc_difference
699 <221> NAME/KEY: VARIANT
700 <222> LOCATION: (1)...(6)
701 <223> OTHER INFORMATION: Xaa = Any Amino Acid
703 <400> SEQUENCE: 6
E--> 704 Lys Xaa Asn Gly Xaa Asn 1 5
hard return

VERIFICATION SUMMARY

DATE: 03/19/2002

PATENT APPLICATION: US/10/087,013

TIME: 16:16:08

Input Set : A:\NIH176.001C1.TXT

Output Set: N:\CRF3\03192002\J087013.raw

L:22 M:270 C: Current Application Number differs, Replaced Current Application No
L:22 M:271 C: Current Filing Date differs, Replaced Current Filing Date
L:662 M:360 E: Sequence data overflow, line data truncated, for SEQ ID#:2
L:662 M:252 E: No. of Seq. differs, <211>LENGTH:Input:3542 Found:3520 SEQ:2
L:671 M:252 E: No. of Seq. differs, <211>LENGTH:Input:32 Found:16 SEQ:3
L:679 M:252 E: No. of Seq. differs, <211>LENGTH:Input:10 Found:0 SEQ:4
L:687 M:252 E: No. of Seq. differs, <211>LENGTH:Input:4 Found:0 SEQ:5
L:704 M:252 E: No. of Seq. differs, <211>LENGTH:Input:6 Found:0 SEQ:6